

Celebrating Consumption

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This paper describes consumption as I have come to see it, presents some background on why, and what this may suggest for the future. The underlying assumption is that we can significantly improve well-being and reduce environmental damage by changing consumption processes in ways not necessarily apparent from production measures. Drawing attention to these benefits will require acknowledging the importance of consumption efficiency and investing resources to increase it.

The paper first reviews traditional approaches to materials¹, then presents the proposed model of consumption and outlines collisions between it and conventional approaches.

Traditional approaches do not adequately address consumption. Explicitly or implicitly, conventional economic discussions define consumption as the point at which a good or service leaves the market. Consumption is then a relatively simple consequence of production and trading systems. While consumer choices among products and trends in the *quantity* of consumption are examined, what people *do* with the products is generally ignored. Thus, the *process* of consumption is absent from the discussions—only purchasing is included. This is not a problem with market or production analysis—problems arise when people believe that these analyses explain more than they do.

Other views, principally found in discussions of equity or the environment have similar lapses around consumption. They take the huge quantity of consumption that occurs in industrialized countries (of resources, materials, and products) as evidence that we should feel *guilty* about consumption and consequently reduce our aggregate level of. While many proponents of this view intuitively believe that quality of life need not be sacrificed (or at least not much), the argument is almost never put forward in detail, or in a compelling manner. The great benefits of current consumption patterns are minimized, so as not to undermine the 'guilt' argument.

A major reason that these approaches avoid grappling with consumption is that at its core is the *destruction of value* (usually economic value). This is not a problem with consumption—it is its essential nature. It is necessary to destroy certain kinds of value to attain the

services we want from materials. The idea of “consumption” (or “use”) has an inherently dual nature. As 'good', objects are *useful*, we as *consumers* are the primary beneficiaries of our economy and we *consume* food. As 'bad', a building may be *consumed* by fire, we can be *consumed* with envy, and to *use* a person is to take unfair advantage. To aid comprehension, it is typical to pretend that one side or the other does not exist. However, a full and correct understanding of consumption requires that both be kept in mind simultaneously.

Figure A outlines a consumption-centered view of reality. Materials and products are produced by industrial processes then passed on to consumption through trade and other means. Consumption is where most items are actually useful to people, where they deliver services that we want. Eventually, every item becomes more trouble to keep around than it is worth, and is thrown away. Consumption begins as an item is acquired, and ends as it is thrown away. We don't ultimately want services—we want a sense of well-being. This is created by a further transformative process of satisfaction—beyond the scope of this paper but a critically important topic. Materials can be recycled from disposal back into production, but that does not inform our understanding of consumption. Other approaches and diagrams are clearly necessary for other purposes.



Figure A. Consumption at the Center

This discussion is based on what holds true for industrial materials with a “high social content” (distinct from building materials and infrastructure materials). They are the materials we use in everyday life, that (for each material) many people interact with and make decisions about. The presence of many actors and uses is part of why consumption efficiency is significant. These are largely the

¹ Due to the wide range of topics and brevity of the paper, no references are included.

same materials that end up in Municipal Solid Waste², though the fact that they end up as waste is more distracting than useful.

It is obvious that production is an elaborate, complex process, amenable to technical and other refinements to improve the results and the efficiency of attaining them. Consumption is also a process, as sophisticated as production, and—as with production — changes can be made to consumption to increase overall efficiency.

Some examples

For background, the following is a quick summary of some lessons from analysis of two products—diapers and office paper. For each, reference is made to the popular view of the topic, the science and policy applied to them, what my own review of the data show, and some conclusions.

Diapers

For a variety of reasons, in the late 1980s and early 1990s diapers made an easy target for concerns over environmental impacts of products. A popular view that disposable diapers were environmentally worse than cloth diapers was in large part replaced by a view that both had considerable impacts so that consumer choice made little difference (particularly regarding energy consumption). The question grew out of concern for Municipal Solid Waste (MSW), but as MSW analysis lacks tools to address such questions, product Life-Cycle Analysis (LCA) was brought in to provide “the answer”. LCA was never designed for this type of purpose, but nevertheless, inventories of average emissions were calculated, and the tabular results reported. Little insight or policy followed and the matter largely receded from view.

Examination of diaper LCA studies shows wide variation among their conclusions, and poor correspondence to the author's own calculations for home washing and measured data from one diaper service. Further, for home washing, individual diapering patterns, washing patterns, and equipment used all greatly influence energy use. These factors are absent from the LCA analyses, which report a mythical assumed average value³. Also absent from the LCA studies is most individual choices and policy options (the only choice presented is switching from one type to another). People can use combinations of diaper types to gain the special advantages each has, and there is probably more for the environment to be gained by changing *how* people use the types of diapers they already use than there is in convincing a few of them to switch from one type to

² Non-industrial waste materials, such as yard debris, do not share many of these characteristics. For example, they are often free or inexpensive to produce as waste and may be more of a burden in disposal than in production or use.

³ Most of these studies go so far as to model a household that heats 47% of its washing water with electricity and 53% with natural gas (a scenario either non-existent or nearly so).

another. Producers also have significant unmodeled choices, such as in materials sourcing (e.g. cotton) and in industrial process efficiency (e.g. washing equipment).

Consumption analysis can reveal the quantitative benefits achievable, the institutions and actors involved, and how to effect the change.

Office Paper

Office paper provides another informative case study. Faced with the burden of excess information and tasks, and with paper as the physical carrier of much of this information, a common reaction is to propose banishing the medium from offices—to make them “paperless”. This follows from seeing paper as embodying “paperwork” that compels us to do what we don't want to. A common assertion is that the introduction of business computers was intended to reduce paper use, and the opposite having occurred is a sign of failure (in fact, computers were introduced for other reasons; reducing paper use was never a major priority). The *naiveté* underlying this follows from a lack of understanding of how consumption actually works. Solid waste professionals rarely do more than exhort people to “please don't waste paper”, and to make more double-sided copies. Rigorous science and policy *has* been applied to electricity use in printing and copying, and has had success in reducing this. However, the more costly energy in the paper has received scant attention.

When paper use is examined as a system, it becomes clear that there are numerous costs of *using* paper that are many times that for actually buying it, including the imaging, shipping, storage, and handling. Thus, gains from paper efficiency (economic and environmental) are considerably larger than just avoiding making the paper itself.

Several rationales can be employed, including waste, energy, and greenhouse gas emissions. However, as with energy use efficiency, it is most effective to aim for cost-effective efficiency improvements in resource use, which in this case translates to 'paper end-use efficiency', or 'paper use efficiency'.

Findings

Both of these cases show that we lack good policy handles and rationales to address materials consumption, and also lack the analytical tools to effectively apply scientific analysis. This raises the question of whether some existing methods should be adapted and expanded, or whether consumption is best dealt with separately. I believe the latter is a better approach, but the question deserves further debate. The following discussion reviews the topic areas that on the surface seem most relevant.

Other Approaches

My own investigations about materials began with the intention of applying the ideas and methods of energy

efficiency to recycling. Energy efficiency (in buildings) had clear success—as an idea, as science, as good policy, and with demonstrable results. The idea of material wastes seems consistent with the notion of 'wasting' energy, and recycling is the dominant approach to improving our waste systems. However, the material analogy to energy efficiency is source reduction, not recycling. It is possible to construct a system of “demand-side management” of solid waste to reduce its rate of production. However, the potential gains (from disposal only) from source reduction in reduced costs and environmental impacts are generally too small to be compelling. Thus, source reduction of MSW *as currently practiced* is not compelling⁴, and so not a good approach for consumption.

Recycling

Recycling is appealing and worthwhile, but essentially apart from questions of consumption and use. Materials only become of interest for recycling after they have lost most or all of their value for use, and recycling feeds the materials to production, not use processes. It is common for models of recycling to minimize or exclude the fact that materials are used⁵. Figure B, from the National Recycling Coalition, is a good example of this. Materials flow directly from purchase as goods to collection as waste; *they are never used*. The result of this is that knowing more about recycling usually impedes, rather than aids, understanding of consumption.

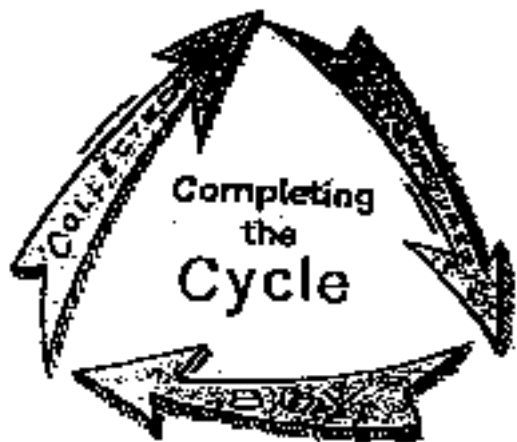


Figure B. A Recycling Model

Source: National Recycling Coalition newsletter, circa 1994.

“Reuse”, in theory and practice, spans the entire range between source reduction and recycling, so is difficult to accurately generalize about.

Life-Cycle Analysis (LCA)

⁴ MSW management (in theory and practice) could be extended to include waste production (and the management thereof) as an integral component. However, this seems unlikely to happen anytime soon.

⁵ Recyclers know as well as anyone that materials are actually used, but through language and practice implicitly recognize that recycling and use have little in common.

LCA began as “Life-Cycle Analysis of Industrial Systems”, and was never designed to model use processes. It is no surprise then that it has been of limited help for understanding materials use, or how to improve it. The way that LCA is usually applied is to conduct a Life Cycle Inventory (part of an LCA), then see what conclusions follow from the results. A more sensible approach would first outline the problem and possible solutions, then assess which analytical tools apply. Depending on the topic, LCA might be dominant tool, a minor one, or completely absent.

Pollution Prevention (PP)

PP is usually defined as reducing the amount of pollution per unit product, so simply reducing the demand for products is not pollution prevention. It is possible to extend PP to commercial services, and measure pollution with respect to the trade in such services. It seems unlikely that PP could be extended to include final consumption and still be a coherent idea. This would also be at odds with how PP has been applied to date. The adoption of the prevention metaphor in 'waste prevention' is troubling, as it implies preventing the original production. Pollution prevention only attempts to prevent *unwanted* byproducts; waste prevention extends this, untenably, to *wanted* products.

Industrial Ecology (IE)

Industrial ecology has an ambiguous relation to consumption. Some definitions do not acknowledge the fact of consumption, and others subsume consumption as one of the entities in the industrial system. Regardless of how useful the idea of industrial ecology is for understanding production (and to some extent disposal) systems, it is not clear how it could help clarify consumption. It seems most likely that IE could be a useful companion to consumption efficiency, with each addressing largely separate areas. Consumption is rarely an industrial process, so even an ecologically-centered view of consumption would not fit in well to IE⁶.

To summarize, none of these approaches is satisfactory for addressing consumption efficiency, indicating the need for separate areas of policy and science designed specifically for consumption. The following discussion delves further into the notion of consumption and consumption efficiency.

The Model

The consumption-centric view is intended to be scientifically correct as well as practically useful for affecting positive change in consumption patterns. The following terms form the core of consumption analysis; Figures A and C help illustrate them.

⁶ An apparent problem with IE for both is that production and consumption systems are driven by human intention, whereas ecological systems do not have such an exogenous intention to satisfy; rather, the physical system dictates the ends. Physical constraints inform *how* we apply our desires, but that they *determine* them is a more tenuous proposition.

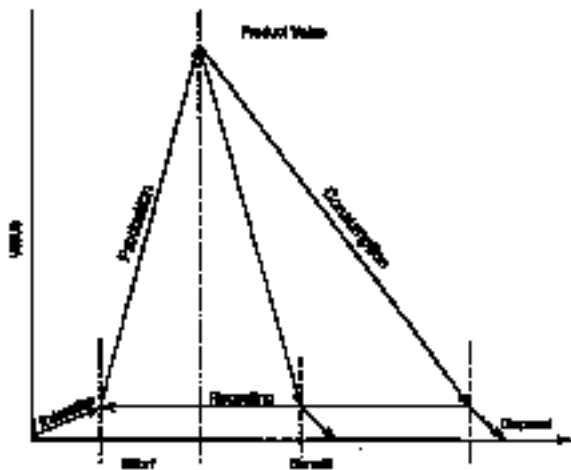


Figure C. The Creation and Destruction of Value
Production

The point of engaging in production is to add value by consuming⁷ some resources (land, labor, capital, etc.) to create useful materials or products⁸. Production usually involves much trade and many institutions to conduct, organize, and facilitate it. Measurement is readily accomplished by counting both mass and dollar quantities that are traded. The fraction of the process that is industrial in nature is usually high. Production is costly in both economic and environmental terms. Efficiency of production is measured as productivity, and assesses how effectively resources are transformed into products (or commercial services).

Consumption

In contrast to production, the essence of consumption is that it destroys the value⁹ of materials and products. It subtracts value, or rather, transforms it from product to service value. Production of commercial services still adds economic value, but many such processes have more in common with consumption than with industrial production processes. Trade is usually absent from final consumption, or when present, difficult to measure. Measurement of consumption is difficult with conventional measures¹⁰ since the lack of trade makes it unclear what mass to count, and dollar aggregation (as with production measures) has limited application. Most activities in consumption have a low level of industrial content; rather they are dominated by social processes. Costs of

⁷ The destruction of natural and human resources in production is quite different from value destruction in consumption.

⁸ The distinction between materials and products is that materials have many uses, are often an intermediate form before incorporation into products, and are fairly easily aggregated. Products embody much more intention as to their ultimate use, and are usually found in discrete units. Products can be reused, but not recycled; materials can be reused or recycled, since the recycling process destroys product characteristics, but not key materials characteristics.

⁹ This is most obviously seen with economic value, but other types of value are also destroyed.

¹⁰ However, consumption is readily measurable with methods designed specifically for consumption.

consumption are usually ambiguous. Defining the boundaries of a consumption activity can be problematic, and a particular product may be used in multiple activities. Environmental costs that occur in consumption vary greatly.

Consumption efficiency is measured as Consumptivity, which is how effectively materials and products are translated to services that people value. While in some cases the connection between a material input and the resulting service is clear, in other cases one must assess an entire activity with a multitude of inputs and resulting services. Consumption is also tied to how we 'spend' time in activities¹¹. Activities organize a 'top-down' analysis of consumption (e.g. clothing, health care, information). A 'bottom-up' approach begins with individual objects.

Consumption is a complex transformative process. It is important to remember that a separate process of satisfaction occurs after consumption, to translate services to well-being.

A key to understanding consumption in efficiency terms (as we do energy) is to treat materials *and products* as a flow, not as discrete objects (again, just as we do with energy). Reducing industrial materials use through increased 'materials efficiency' is defined as reducing the "mass of paper per unit of service delivered".

Disposal

Disposal of materials used in final consumption¹² has a relatively small cost, by all criteria (except perhaps psychological). Disposal receives disproportionate attention because it is a convenient repository for unease with production and consumption. Also, we can improve waste systems without articulating the true nature of production and consumption (and question prevailing myths). These are some key terms, but others will need to be created or adapted as we fully address consumption.

Discussion

The consumption-centered view leads to several conclusions about our present circumstance including fundamental incompatibilities with common beliefs.

Operating Myths

Conventional views of our economy and society rely on and result in several myths. Myths are stories that are not true, but are useful to treat as true to help explain reality. For example, while the earth is ultimately spherical, for local purposes we treat it as if it were flat. The burden of calculating and applying the sphericity would not be worth the trouble for most purposes (such as building design). However, it is critical to know the limits of such myths, or

¹¹ Time is one of the most non-renewable of resources.

¹² Recycling is a form of disposal, as are landfilling, incineration, and composting.

wrong conclusions will be drawn. Several myths problematic for consumption are that:

Well-being follows directly from production (e.g. GDP)

This allows the typical belief that the “standard of living” (presumably a measure of well-being) is to be measured by production. A corollary is that “consumption efficiency” (if the term were used) is constant, in individual circumstances, across space (regions and countries), and across time. A further corollary is that there is no need to measure consumption, since production (and trade) measures will capture all that is important. The only way to increase well-being is to raise production.

Consumption occurs at acquisition

This is most often put forth by those who believe that society has insufficient guilt about consumption. Consumption is equated to shopping, and it is implied that much of what people buy is irrelevant to their well-being (this is consistent with the idea that there is ‘good consumption’ and ‘bad consumption’). This myth also avoids needing to articulate how people use products.

Consumption occurs in disposal

This is most commonly articulated by those involved with disposal (such as recyclers), and presumes that minimal value is lost during use, and so long as materials are recycled, they are not “wasted”¹³. This makes it difficult to associate consumption with all but a few costs of production, undermining most arguments for consumption efficiency.

Note that the “production implies well-being” approach neither requires nor prohibits the equation of consumption and acquisition, as one can believe that products are useful for a long period of time without acknowledging that there is any question of efficiency. A common problem with all of these myths is that they imply that consumption is uninteresting and that understanding it better is not a priority.

Fundamental Truths

Amongst these myths, several truths emerge from the consumption view

Production == Consumption

(always in the long run, often in the short run)

This is similar to the identity between precipitation and evaporation of water, or the conservation of energy and mass in the laws of physics. Two corollaries are that “Everything that gets produced eventually gets thrown away” (with a few minor exceptions), and that “the interesting question is not if, or how much, is consumed, but is how well”. Any guilt or pride in production or consumption must be transferred to the other.

¹³ Visualize a juggler effortlessly keeping many balls in the air, with problems and burdens only occurring when they fall out of circulation onto the ground.

Production interferes with consumption

(not always, but more often than not)

Physically, socially, and economically, the presence of additional productive capacity and all that it entails makes it more difficult for people to consume well. This can be due to use of land, resulting pollution, or disrupted social relations. For much of production, the benefits of the consumption it allows outweigh the costs, so it is socially worth doing. However, this doesn't alter the fact of interference with consumption.

Consumption is a complex transformative process

As noted before, consumption is a process, not a static fact. Discussions and analysis of consumption that fail to build on this will generally come to wrong conclusions.

Consumption analysis must be science-based to succeed

The success of energy efficiency indicates the power of good science to overturn myths and shed light on topics that previously seemed unknowable. The application of LCA to some consumption processes suggests that science will be applied—the challenge is to insure that the correct methods and good science are used.

Consumption is inherently linear

For those fond of materials recycling, the fact that consumption obeys different law is disappointing. Nevertheless, there is no way to map the linear path of the transformation of value as it moves through industrial production, consumption, and on to satisfaction.

Time Trends

Truths about consumption have evolved considerably over recent decades and centuries. Figure D expresses this schematically—consumptivity or well-being can't currently be quantified this way (any more than utility in conventional economics can be), but the concept is useful. Ever since production began climbing at the beginning of the industrial revolution, quantitative gains in production have been tempered by declines in consumptivity. While this effect was small in comparison to rises in production, there was little harm in ignoring it. However, industrialized countries may have reached the point at which consumptivity declines match or exceed production gains. There is a danger of a long period of diminishing well-being. However, attention to consumption could facilitate rising well-being (whether production continues to rise, or preferably falls).

Rising rates of production are likely for the foreseeable future, particularly for developing countries. For developing countries to avoid the high production levels of industrialized countries, their best option is to aim for high levels of consumptivity. The fact of past falling consumptivity need not be of concern so long as the rate is low enough. For industrialized countries, with our

consumptivity as low as it is, we can reasonably expect to be able to raise it considerably (if we try).

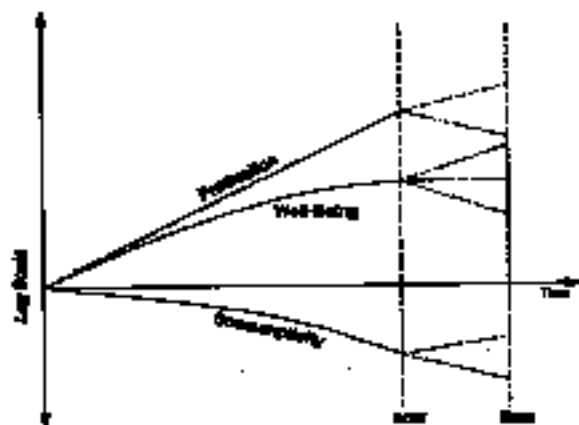


Figure D. Societal Well-being

Serial Transformations

Figure E shows the successive transformative processes that industrial materials pass through. Materials are extracted from the earth and concentrated and manipulated to make bulk commodities. When transformed into products, materials may not be entirely lost, but their value as materials diminishes greatly. For example, electronic circuits contain many high-value elements, such as gold, that are significantly reduced in material value through dispersion among the other elements in the circuits, even as product value is gained. Both processes are part of production.

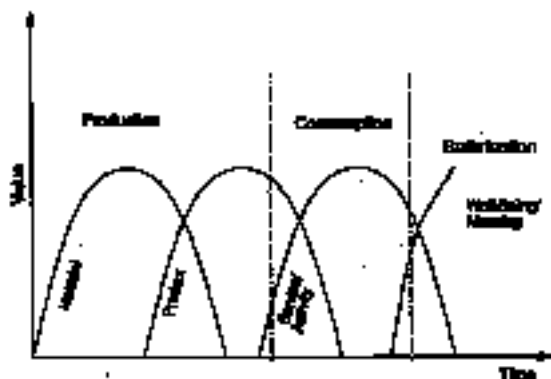


Figure E. Serial Transformations

Consumption enters as people begin using products. Over time, with use and without, products lose economic value and use value (for the consumer). During consumption, services are rendered to the consumer, typically over a particular finite time period. The services themselves are not actually indicative of well-being, but are the inputs to a final transformative process of satisfaction. Consumption efficiency does not address satisfaction; like production before it, it presumes that “satisfaction efficiency” (if this is even the right concept) is constant. Satisfaction needs to be addressed by others before we will have a complete set of methods.

Outlook

There are a number of important outstanding questions relating to consumption. These include:

- Which disciplines, government policies (agencies) and other organizations should be at the core of consumption analysis?
- How do we confront contradictions between results of consumption analysis and 'conventional wisdom'? / prevailing/dominant views

It seems likely that any near-term success for consumption will involve building on energy efficiency, with attention to “materials end-use efficiency”¹⁴.

Conclusions

A consumption-based perspective does not deny the usefulness of others and should be used in addition to, not instead of, them. It provides an additional way to understand and improve the world, so is essentially optimistic (this is part of the motivation to “celebrate” it). Consumption may be particularly useful for those wanting to reduce environmental damage, as it can help identify significant changes that may not change well-being, but that allow significant reductions in destructive production.

The prospects for consumption analysis are unclear. It calls into question several widely held assumptions, and takes away some (not all) of the moral imperative for production, and in particular, rising levels of production. It also conflicts with many other social and governmental goals that call for increasing production and increasing the aggregate work (jobs) that needs to be done. There is increasing recognition of the disconnect between rising levels of production and most people's sense of individual and social well-being. Many responses to this look for scapegoats or put blind faith in some system (e.g. religion or the market). Improving consumption may be one of several mechanisms of social transformation that have few losers and a wide array of co-benefits, and so be worthy of further consideration and investment.

A key to understanding the importance of consumption is that it is a *process*, not a static fact. Consumption is usually ignored or denounced, both of which obscure its true nature. If we are to improve consumption, we should *feel good* about it, *pay attention* to it, *do it well*, have *fun*—“celebrate consumption”.

¹⁴ The term “materials efficiency” is useful, (though some use this latter term to include production efficiency).